

PO No	Supplier	Line Item No	Rel No	Terms	Purchased Item	Description	For Part No	Project	Equipment ID	Order Qty	Due Date	Received Quantity	Accounting Job No	Serial No	Status	Receive Date	Price/Unit	Aging Days	Past Due	Total	Supplier Name
PO038421	MEC002-VU	1	1	Net 30	M17-4-H1150-R2.500	17-4 SS H1150 Round Bar 2.500" : MATERIAL: 17-4 PH CONDITION H1150 receive ft				12	1/18/2018	13		S030421	Stock	1/2/2018	\$ 46.95 / ft	7		\$612.32	Metaux Castle
		3			M17-4-H1150-R4.000	17-4 SS H1150 Round Bar 4.000" : MATERIAL: 17-4 PH CONDITION H1150 receive ft				5		5		S030422	Stock	1/2/2018	\$ 113.29 / ft	7		\$557.05	Metaux Castle
Total:										17		18								\$1,169.37	

Plex 1/9/2018 11:43 AM Dart.Plouffe.Sonia

Status: Receiving

 Part: **M17-4-H1150-R4.0**

Created: 1/9/18 11:42 AM DART.PLOUFFE.SO


 Serial No: **S030422**

Status: Receiving

 Part: **M17-4-H1150-R2.5**

Created: 1/9/18 11:42 AM DART.PLOUFFE.SO


 Serial No: **S030421**



Castle Metals®

A. M. Castle & Co.

PACKING SLIP/  
CERTIFICATE OF CONFORMANCE

Page 1 of 1

Pack Slip No: 2802174

<b>Ship From:</b> A. M. Castle & Co. (Canada) Inc. Toronto 2150 Argentea Road MISSISSAUGA, ON L5N 2K7		<b>Sold To:</b> DART AEROSPACE LTD 1270 ABERDEEN HAWKESBURY, ON K6A 1K7 CA		<b>Ship To:</b> DART AEROSPACE LTD 1270 ABERDEEN HAWKESBURY, ON K6A 1K7 CA	<b>Deliver To:</b> DART AEROSPACE LTD 1270 ABERDEEN HAWKESBURY, ON K6A 1K7 CA
<b>Date Shipped</b> 02-JAN-2018	<b>F.O.B.</b> ORIGIN	<b>Freight Terms</b> Prepaid	<b>Carrier</b> LOCAL FLEET	<b>BOL No</b> 2814995	<b>Delivery No</b> 121504113

<b>Shipment Details</b>		<b>Final Destination Branch -</b>
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<b>Order No</b> 4995065	<b>Line No</b> 2	<b>Item No</b> 39902	<b>Description</b> 4.0000 RD.17CR-4NI.STAINLESS.CF.H1150. 58"LONG SPECIFICATIONS: AMS 5643
<b>Purchase/Order No</b> 38421	<b>Part Number</b>	<b>Ordered Qty</b> 58.90 IN	<b>Invoice Qty</b> 4.9167 FT

<b>Details</b> ALL PAPERWORK MUST FOLLOW ORDER / CUSTOMER MUST RECEIVE AT TIME OF DELIVERY ALL MATERIAL MUST HAVE IDENTIFYING MARKINGS EX:HEAT #'S Email P/s and certs to: clavoie@dartaero.com END USER: DART AEROSPACE END USE: COMMERCIAL AIRCRAFT PARTS			
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<b>Mill/Source</b> CARPENTER TECHNOLOGY	<b>Heat Number</b> 971414	<b>Mech ID</b>	<b>PCS</b> 1	<b>Width (IN)</b>	<b>Length (IN)</b> 59.0000	<b>Shipped Qty (LBS)</b> 209.7794
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<b>Signature</b> 		<b>Date</b> 2/10/18	<b>Name</b> Eric Delaney
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We hereby certify the material covered by this certification conforms in accordance with the above specifications and has been found to meet the applicable requirements for the material, including any specifications forming a part of the description. Test reports are on file subject to examination. All claims for defective material are waived unless made in writing to A.M. Castle & Co. within 60 days of the shipment. Material cut to the correct size, or material cut by the customer cannot be returned for credit.

Reviewed by Authorized Castle Metals Representative:



Castle Metals®

A. M. Castile & Co.

PACKING SLIP/  
CERTIFICATE OF CONFORMANCE

Page 1 of 1

Pack Slip No:2802175

<b>Ship From:</b> A. M. Castile & Co. (Canada) Inc. Toronto 2150 Argentinia Road MISSISSAUGA, ON L5N 2K7		<b>Sold To:</b> DART AEROSPACE LTD 1270 ABERDEEN HAWKESBURY, ON K6A 1K7 CA		<b>Ship To:</b> DART AEROSPACE LTD 1270 ABERDEEN HAWKESBURY, ON K6A 1K7 CA		<b>Deliver To:</b> DART AEROSPACE LTD 1270 ABERDEEN HAWKESBURY, ON K6A 1K7 CA	
<b>Date Shipped</b> 02-JAN-2018	<b>F.O.B.</b> ORIGIN	<b>Freight Terms</b> Prepaid	<b>Carrier</b> LOCAL_FLEET	<b>BOL No</b> 2814994	<b>Delivery No</b> 121508207		

Shipment Details

Final Destination Branch -

<b>Order No</b> 4995065	<b>Line No</b> 1	<b>Item No</b> 46802	<b>Description</b> 2.5000/RD.17CR-4NI.STAINLESS/CF.H1150.132.0000-T56-0600 SPECIFICATIONS: AMS 5643
<b>Purchase Order No</b> 38421	<b>Part Number</b>		<b>Ordered Qty</b> 12.00 FT
			<b>Invoice Qty</b> 13.0417 FT

Details

ALL PAPERWORK MUST FOLLOW ORDER / CUSTOMER MUST RECEIVE AT TIME OF DELIVERY  
ALL MATERIAL MUST HAVE IDENTIFYING MARKINGS EX:HEAT #S  
Email P/s and certs to: clavoie@dartaero.com  
END USER: DART AEROSPACE  
END USE: COMMERCIAL AIRCRAFT PARTS

<b>Mill/Source</b> OUTOKUMPU STAINLESS INC.	<b>Heat Number</b> G23367	<b>Mech ID</b>	<b>PCS</b> 1	<b>Width (IN)</b>	<b>Length (IN)</b> 156.5000	<b>Shipped Qty (LBS)</b> 217.3524
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We hereby certify the material covered by this certification conforms in accordance with the above specifications and has been found to meet the applicable requirements for the material, including any specifications forming a part of the description. Test reports are on file subject to examination. All claims for defective material are waived unless made in writing to A. M. Castile & Co. within 60 days of the shipment. Material cut to the correct size, or material cut by the customer cannot be returned for credit.

Reviewed by Authorized Castle Metals Representative:



Date: 12/09/14

Name: Eric Delaney



Dart Aerospace Ltd.  
1270 Aberdeen St  
Hawkesbury, ON  
K6A 1K7  
Canada

Tel (613) 632-5200

## PURCHASE ORDER PO038421

**Supplier:** MEC002-VU  
Metaux Castle  
P.O. Box 4090 Str A  
Toronto  
ON  
M5W OE9 Canada

**PO No:** PO038421  
**PO Date:** 11/20/17  
**Due Date:** 1/18/18

**E-MAILED**  
DEC 21 2017

**Purchase Order  
Revision:**

**Revision Date:**

**Ship-To Contact:** Lavoie, Chantal  
clavoie@dartaero.com

**Ship To:** 1270 Aberdeen Street  
Hawkesbury  
ON  
K6A 1K7 Canada  
Phone: 613-632-5200

**Via:** Ground

**Pymt Terms:** Net 30

**Freight Terms:**

**Special Comments:**

### Items

Line Item	Part	Supplier Part No	Description	Status	Due Date	Order Quantity	Received Quantity	Balance	Unit Price (USD)	Extended Price
1	M17-4-H1150-R2.500		17-4 SS H1150 Round Bar 2.500" : MATERIAL: 17-4 PH CONDITION H1150 receive ft	Firmed	1/18/18	12 ft	0 ft	12 ft	\$46.95/ft	\$563.40
2	M17-4-H1150-R3.500		17-4 SS H1150 Round Bar 3.500" : MATERIAL: 17-4 PH CONDITION H1150 receive ft	Firmed	1/18/18	12 ft	0 ft	12 ft	\$112.93/ft	\$1,355.16
3	M17-4-H1150-R4.000		17-4 SS H1150 Round Bar 4.000" : MATERIAL: 17-4 PH CONDITION H1150 receive ft	Firmed	1/18/18	4.833 ft	0 ft	5 ft	\$113.29/ft	\$547.53
Grand Total:										\$2,466.09

### Order Notes

#### Procurement Quality Clauses

A005 right of entry  
A012 chemical and physical test report  
A016 personnel qualification  
A017 raw material identification (as applicable)  
A026 certification of material conformance  
A041 quality management system  
A042 dart notification by supplier  
A043 retention of quality documents

A048 counterfeit parts avoidance, detection, mitigation and disposition program

A049 supplier awareness

Terms & Condition of Purchasing(Suppliers) and Procurement Quality Clauses are an integral part of our AS9100 requirements. To learn in detail, please visit [www.dartaerospace.com](http://www.dartaerospace.com) for further explanation.

Plex 12/21/17 2:00 PM dart.lavoie.chantal

## Chantal Lavoie

---

**From:** Desbiens, Marc <mdesbien@amcastle.com>  
**Sent:** Wednesday, December 20, 2017 2:20 PM  
**To:** Chantal Lavoie  
**Subject:** RE: quote

Hi Chantal,

price and delivery on mat'l.

17-4 H1150 round bar 2.500" x 12 ft \$ 46.95 FT 1 week ✓  
~~17-4 H1150 round bar 3" x 12 ft late February only~~  
17-4 H1150 round bar 3.500" x 12 ft \$ 112.93 FT 3 weeks  
17-4 H1150 round bar 4" x 6 ft  
1 pce 42" &/or 1 pce 58" Long \$ 113.29 FT 1 week

Thanks

Marc Desbiens  
Inside sales representative  
Castle Metals, Montreal, QC  
Direct line 514-795-8176  
1-800-806-6660 ext 52226  
Fax # 1-855-892-6370  
*Customized Supply Chain Solutions for Your Metal Needs*

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# MATERIAL RECEIPT INSPECTION FORM

MATERIAL: M17-4-H1150-R2.500

PO / BATCH NO.: 038421/5030421

DATE: JAN 09 2018

MATERIAL CERT REC'D: YES  
 QUANTITY RECEIVED: 13"  
 QUANTITY INSPECTED: 13"  
 QUANTITY REJECTED: 0

THICKNESS ORDERED: 2.500  
 THICKNESS RECEIVED: 2.500  
 SHEET SIZE ORDERED: N/A  
 SHEET SIZE RECEIVED: N/A

DESCRIPTION	NCR (Check Y/N)	COMMENTS
SURFACE DAMAGE	Y <input checked="" type="radio"/> N	
CORRECT FINISH	<input checked="" type="radio"/> Y N	
CORROSION	Y <input checked="" type="radio"/> N	
CORRECT GRAIN DIRECTION	<input checked="" type="radio"/> Y N	
CORRECT MATERIAL PER M-DRAWING	<input checked="" type="radio"/> Y N	<u>Astm A564</u>
CORRECT THICKNESS	<input checked="" type="radio"/> Y N	
PHOTO REQUIRED	Y <input checked="" type="radio"/> N	
CORRECT REF # TO LINK CERT	<input checked="" type="radio"/> Y N	<u>Heat # G 23367</u>
CORRECT MATERIAL IDENTIFICATION	<input checked="" type="radio"/> Y N	
CORRECT M# ON THE MATERIAL	<input checked="" type="radio"/> Y N	
DOES THIS MATERIAL REQUIRE ENGINEERING SIGN OFF	Y <input checked="" type="radio"/> N	
DOES THIS REQUIRE AN EXTRUSION REPORT	Y <input checked="" type="radio"/> N	

CUT SAMPLE PIECE OF MATERIAL AND PERFORM A HARDNESS CHECK. RECORD RESULTS BELOW					
	HRC	HRB	DUR A	DUR D	WEBSTER
TYPE OF MATERIAL					
SIZE OF TEST SAMPLE					
HARDNESS / DUROMETER READING					

testers located in the Quality Office

QC 18 INSPECTION		ENGINEERING SIGNOFF (if required)
INSPECTED BY: <u>DAS 11</u> DATE: <u>9-89 JAN 09 2018</u>	SIGNED OFF BY: _____ DATE: _____	

Attach this inspection sheet with the corresponding material cert and remit to be scanned and received in

# SPECIFICATION CONTROL DRAWING

PURCHASE MATERIAL: 17-4 PH / S17400 / TYPE 630 SS ROUND BAR  
GRAIN MUST BE ALONG LENGTH OF BAR  
MINIMUM YIELD STRENGTH PER TABLE  
MINIMUM ULTIMATE STRENGTH PER TABLE

SPECIFICATION: AMS 5643 OR ASTM A564  
PART NUMBER: M17-4-111111-1 R X.XXX WHERE: 111111 SPECIFIES THE MATERIAL CONDITION (PER TABLE BELOW)  
COND O.D. X.XXX = DIAMETER (IN INCHES)

## MATERIAL CONDITION TABLE:

CODE	CONDITION	MIN YIELD TENSILE STRENGTH (KSI)	MIN ULTIMATE TENSILE STRENGTH (KSI)
(OMITTED)	NONE SPECIFIED (CONDITION A NOT ACCEPTABLE)	100	150
H900	H900	170	190
H925	H925	195	170
H1025	H1025	145	155
H1075	H1075	125	145
H1100	H1100	115	140
H1150	H1150	105	135
CONDA	CONDITION A (SOLUTION TREATED)		

NOTES: MATERIAL IN H900 AND H925 CONDITION NOT RECOMMENDED FOR TENSION OR SHEAR APPLICATIONS IN COLD WEATHER CONDITIONS  
MATERIAL IN H900 AND H925 CONDITION NOT RECOMMENDED FOR APPLICATIONS WHERE STRESS CORROSION CRACKING IS POSSIBLE  
CONDITION A NOT TO BE USED IN DESIGN FOR FINAL PRODUCT AND SHOULD ALWAYS BE HEAT TREATED

## EXAMPLES:

PART 4.000" DIAMETER BAR MIN LTS = 150 KSI MIN VTS = 100 KSI  
2.500" DIAMETER BAR H900 CONDITION M17-4-R4.000  
3.250" DIAMETER BAR H1025 CONDITION M17-4-H1025-R3.250  
0.750" DIAMETER BAR A CONDITION M17-4-CONDA-R0.750

RELEASED  
2017-10-31  
EQU17-718

APPROVED

C	ADDED MATERIAL CONDITION (CIR17-107)	NO	17.09.14
B	RECORDED DWS. STAMPED TO PURCHASE MATERIAL (2N DE-1), ADD R&B SPEC (C6-1), REF PAR 08-020A	VS	10.05.20
A	NEW ISSUE	CP	05.03.16
DESIGN	NO	DESCRIPTION	DATE
DRAWN	NO	DART AEROSPACE LTD	
CHECKED	CP	HAWKESBURY, ONTARIO, CANADA	
MFG. APPR.	RA	DRAWING NO. M17-4-R	REV. C
APPROVED	WM	TITLE 17-4 SS ROUND BAR	SHEET 1 OF 1
DE APPR.	CP	SCALE	NTS
DATE	17.09.14		

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# MATERIAL RECEIPT INSPECTION FORM

MATERIAL: M17-4H1150-R4.000  
 DATE: JAN 09 2018

PO / BATCH NO.: 038421/SC30422

MATERIAL CERT REC'D: Yes  
 QUANTITY RECEIVED: 5"  
 QUANTITY INSPECTED: 5"  
 QUANTITY REJECTED: 0

THICKNESS ORDERED: 4.000  
 THICKNESS RECEIVED: 4.000  
 SHEET SIZE ORDERED: N/A  
 SHEET SIZE RECEIVED: N/A

DESCRIPTION	NCR (Check Y/N)	COMMENTS
SURFACE DAMAGE	Y <input checked="" type="radio"/> N	
CORRECT FINISH	<input checked="" type="radio"/> Y <input checked="" type="radio"/> N	
CORROSION	<input checked="" type="radio"/> Y <input checked="" type="radio"/> N	
CORRECT GRAIN DIRECTION	<input checked="" type="radio"/> Y <input checked="" type="radio"/> N	
CORRECT MATERIAL PER M-DRAWING	<input checked="" type="radio"/> Y <input checked="" type="radio"/> N	<u>Astm A564</u>
CORRECT THICKNESS	<input checked="" type="radio"/> Y <input checked="" type="radio"/> N	
PHOTO REQUIRED	<input checked="" type="radio"/> Y <input checked="" type="radio"/> N	
CORRECT REF # TO LINK CERT	<input checked="" type="radio"/> Y <input checked="" type="radio"/> N	<u>Heat# 971414</u>
CORRECT MATERIAL IDENTIFICATION	<input checked="" type="radio"/> Y <input checked="" type="radio"/> N	
CORRECT M# ON THE MATERIAL	<input checked="" type="radio"/> Y <input checked="" type="radio"/> N	
DOES THIS MATERIAL REQUIRE ENGINEERING SIGN OFF	Y <input checked="" type="radio"/> N	
DOES THIS REQUIRE AN EXTRUSION REPORT	Y <input checked="" type="radio"/> N	

CUT SAMPLE PIECE OF MATERIAL AND PREFORM A HARDNESS CHECK. RECORD RESULTS BELOW					
	HRC	HRB	DUR A	DUR D	WEBSTER
TYPE OF MATERIAL					
SIZE OF TEST SAMPLE					
HARDNESS / DUROMETER READING					

testers located in the Quality Office

QC 18 INSPECTION		ENGINEERING SIGNOFF (if required)	
INSPECTED BY: <u>DAS 11</u>	SIGNED OFF BY: _____		
DATE: <u>9-89</u> <u>JAN 09 2018</u>	DATE: _____		

Attach this inspection sheet with the corresponding material cert and remit to be scanned and received in



# SPECIFICATION CONTROL DRAWING

PURCHASE MATERIAL: 17-4 PH / S17400 / TYPE 630 SS ROUND BAR  
GRAIN MUST BE ALONG LENGTH OF BAR  
MINIMUM YIELD STRENGTH PER TABLE  
MINIMUM ULTIMATE STRENGTH PER TABLE

SPECIFICATION: AMS 5643 OR ASTM A564  
PART NUMBER: M17-4- HHHH- R | X.XXX |  
COND O.D. |

WHERE: HHHH SPECIFIES THE MATERIAL CONDITION (PER TABLE BELOW)  
X.XXX = DIAMETER (IN INCHES)

MATERIAL CONDITION TABLE:

CODE	CONDITION	MIN YIELD TENSILE STRENGTH (KSI)	MIN ULTIMATE TENSILE STRENGTH (KSI)
(OMITTED)	NONE SPECIFIED (CONDITION A NOT ACCEPTABLE)	100	150
H900	H900	170	190
H925	H925	155	170
H1025	H1025	145	155
H1075	H1075	125	145
H1100	H1100	115	140
H1150	H1150	105	135
CONDA	CONDITION A (SOLUTION TREATED)		

NOTES: MATERIAL IN H900 AND H925 CONDITION NOT RECOMMENDED FOR TENSION OR SHEAR APPLICATIONS IN COLD WEATHER CONDITIONS  
MATERIAL IN H900 AND H925 CONDITION NOT RECOMMENDED FOR APPLICATIONS WHERE STRESS CORROSION CRACKING IS POSSIBLE  
CONDITION A NOT TO BE USED IN DESIGN FOR FINAL PRODUCT AND SHOULD ALWAYS BE HEAT TREATED

## EXAMPLES:

PART NUMBER  
4.000" DIAMETER BAR MIN UTS = 150 KSI; MIN YTS = 100 KSI  
2.500" DIAMETER BAR H900 CONDITION  
3.250" DIAMETER BAR H1025 CONDITION  
0.750" DIAMETER BAR A CONDITION

RELEASED  
2017-10-31  
E(w17-728)

APPROVED

C	ADDED MATERIAL CONDITION (CIR17-107)	NO	17.09.14
B	REFORMAT DWG. S17400 TYPE 630 ADDED TO PURCHASE MATERIAL (ZN D8-1), ADD A564 SPEC (CB-1), NEW PART 08-020A	VS	10.05.20
A	NEW ISSUE	CP	05.03.16
REV.	DESCRIPTION	BY	DATE
DESIGN	NO	NO	
DRAWN	NO	CP	
CHECKED	CP	RA	
MFG. APPR.	RA	WM	
APPROVED	WM	CP	
DE APPR.	CP		
DATE	17.09.14		
DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA			
DRAWING NO. M17-4-R			
TITLE 17-4 SS ROUND BAR			
SCALE SHEET 1 OF 1			
NTS			
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# CARPENTER

Carpenter Technology Corporation  
101 West Bern Street Reading, Pa. 19601  
Tel: (610) 208-2000 (800) 338-4592

- THE RECORDING OF FALSE STATEMENTS OR FALSIFICATION OF RESULTS ON THIS FORM IS A VIOLATION OF FEDERAL STATUTES INCLUDING FEDERAL LAW, TITLE 18, CHAPTER 47
- IN ALL CASES AND OTHER TECHNICAL DATA RELATING TO RESULTS OF ANALYSIS AND TESTS MADE ON SAMPLES COLLECTED FROM THE TOTAL LOT, ORIGINAL DATA RECORDS CAN BE TRACED BY REFERENCE TO THE CARPENTER ORDER NUMBER
- MATERIAL IS MANUFACTURED BY CARPENTER TECHNOLOGY, FARMER, ALTHA AND WAGNER STEEL CORPORATION
- THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL, WITHOUT THE WRITTEN CONSENT OF CARPENTER TECHNOLOGY CORPORATION

04/15/16

CUSTOMER: BUSSELEK, OTTENT

AM CASTLE & CO

3400 N WOLF RD  
FRANKLIN PARK IL 60131

SELLER: VERKÄUFER: VENDEUR: PAGE 1 OF 2

HVL

CUSTOMER ORDER NO. (N° DE COMMANDE)	CARPENTER ORDER NO. (N° DE COMMANDE)	DATE (DATE)	QUANTITY (QUANTITE)
367314	W83771	04/15/16	1510.000

HEAT NUMBER: SCHMELZENR. (N° DE COULEE):

971414

UNS NUMBER S17400

PRODUCT DESCRIPTION: TYPE 17-4 SOLUTION ANNEALED COLD FINISH AGED CONDITION  
H1150  
PART NUMBER: 39902

SPECIFICATION: AM CASTLE AMC 3174 04 UNS S17400 REV 38 (12/11/15)  
AMS 2303 REV F (08/ /10)  
AMS 5643 MODIFIED COND H1150 REV T (12/ /13) (MOD COND H1150)  
ASTM-A564-13 COND H1150 TYPE 630  
ASME-SA564 COND H1150 2013 EDITION

SIZE 4.000000 IN. (101.60 MM) RD BAR

HEAT CHEMISTRY (WT%):

C	0.03	NI	4.26	SI	0.27	P	0.019	S	0.023	CR	15.26
MO	0.16	CU	4.01	N	0.031	CB	0.25	TA	LT	.02	
CB+TA	0.25										

NO WELD REPAIR.

MATERIAL IS MANUFACTURED FREE FROM MERCURY, RADIUM AND ALPHA SOURCE CONTAMINATION.

THIS HEAT MELTED BY THE ELECTRIC ARC/AOD PROCESSES

DISCS MACROETCHED AND APPROVED

HARDNESS AS SHIPPED 311HBW ( 33HRC )



CHARPY V-NOTCH IMPACT, TESTED AT 70 F LONGITUDINAL  
FT-LBS (JOULES) 92.0 ( 125 ) 90.0 ( 122 ) 96.0 ( 130 )  
LAT. EXP. (INCHES (MM)) .0560 ( 1.422 ) .0560 ( 1.422 ) .0540 ( 1.372 )  
SHEAR FRACTURE (%) 70.0 80.0 80.0  
AVERAGE: 93.0 FT/LB  
SPECIMEN SIZE: 10MM X 10.0MM

(T) RANSVERSE (L) ONGITUDINAL  
YIELD STRENGTH, (0.20 %) KSI (MPA) L 120.0 ( 827 )  
TENSILE STRENGTH, KSI (MPA) 140.0 ( 965 )  
ELONGATION IN 2.00", % 21.0  
REDUCTION OF AREA, % 61.0

MAGNETIC PARTICLE: FREQUENCY = 0 / SEVERITY = 0

CONTINUED ON NEXT PAGE

**CERTIFICATE OF TESTS**  
CERT SERIAL# 001018963

ABNAHMEPRUEFZEUGNIS

CERTIFICAT DE CONTROLE



**CARPENTER**

Carpenter Technology Corporation  
101 West Bern Street, Reading, Pa. 19601  
Tel (610) 208-2000 (800) 338-4592

- THE RECORDING OF TESTS, THE RECORDING OF PERFORMANCE STATEMENTS OR RESULTS ON THIS DOCUMENT MAY BE PURSUED AS A FACTORY UNDER FEDERAL STATUTES INCLUDING FEDERAL TAX, TITLE 18, CHAPTER 49.
- THE VALUES AND OTHER INFORMATION DATA REPORTED ON THE RESULTS OF ANALYSIS AND TESTS MADE ON SAMPLES COLLECTED FROM THE TOTAL LOT ORIGINATED DATA RECORDS CAN BE TRACED BY REFERENCE TO THE CARPENTER ORDER NUMBER.
- MATERIAL IS MANUFACTURED FROM HIGH PURITY, RADIATION ALLOY AND GARBAGE-SOURCE CONTAMINATION.
- THIS CERTIFICATE SHALL NOT BE REPRODUCED, EXCEPT IN WRITING, WITHOUT THE WRITTEN CONSENT OF CARPENTER TECHNOLOGY CORPORATION.

04/15/16

CUSTOMER BENEFIT/STUDENT

AM CASTLE & CO

SELLER VERKÄUFER VENDEUR PAGE 2 OF 2

3400 N WOLF RD  
FRANKLIN PARK IL 60131

HVL

CUSTOMER ORDER NO. / KUNDENBESTELL-NR. / NO. DE COMMANDE	CERTIFICATE NO. / ZERTIFIKAT-NR. / NO. DE CERTIFICAT	DATE / DATUM / DATE	LOT / PART / LOT-NO. / PART-NO.
367314	W83771	04/15/16	1510.000

HEAT NUMBER / SCHMELZE-NR. / N° DE COULEE:  
MICROSTRUCTURE - FERRITE

971414  
4.00%

UNS NUMBER S17400

MILL HEAT TREATMENT:

TYPE	SOL ANL	AGE
TEMP	1900F ( 1038C)	1150 ( 621C)
TIME	60.00 MINUTES	240.00 MINUTES
4 QUENCH	AIR	AIR

MELTED IN THE USA

REDUTION RATIO - 6:1

MATERIAL HAS BEEN MELTED IN USA OR QUALIFYING COUNTRY TO DFARS REQUIREMENTS 252.225-7014 WITH ALTERNATE 1 FOR QUALIFYING COUNTRY 225.872.1, SUPERSEDED BY DFARS REQUIREMENTS DFARS 252.225-7008 AND 252.225-7009. THIS ORDER WAS MANUFACTURED IN ACCORDANCE WITH CARPENTER SPECIALTY ALLOYS OPERATIONS QUALITY PROGRAM MANUAL, REVISION 34 DATED 11/18/15.

CARPENTER'S QUALITY MANAGEMENT SYSTEM WAS REGISTERED AS OF NOVEMBER 24, 2013 TO THE REQUIREMENTS OF ISO 9001:2008 APPROVAL CERTIFICATE 13-1996R BY PERFORMANCE REVIEW INSTITUTE. THIS CERTIFICATE OF TEST IS TYPE 3.1 PREPARED IN ACCORDANCE WITH EN 10204 (DIN 50049). WE HEREBY CERTIFY THAT THE ABOVE TEST DATA ARE IN ACCORDANCE WITH THE PURCHASE ORDER AND SPECIFICATION REQUIREMENTS, AS DOCUMENTED IN THIS CERTIFICATE OF TESTS.

TEST METHODS ARE PER THE ASTM STANDARDS ON FILE AND IN EFFECT AT TIME OF ORDER ACCEPTANCE, STANDARD PRACTICES, OR AS AGREED UPON BETWEEN CARPENTER & CUSTOMER.

SHARON S. BRUNSON  
QUALITY ASSURANCE REP.  
CARPENTER TECHNOLOGY CORPORATION

*Sharon Brunson*



# Certificate of Test

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HEAT G23367 ORDER 666310/ 01 BOL 0237083 \* CERTIFICATION \* 09/30/16

SHIP TO:  
A.M.CASTLE & CO.  
3800 ENTERPRISE DRIVE

JANESVILLE 535460000

CHEMICAL COMPOSITION			
Carbon (C)	.027	Manganese (Mn)	.810
Phosphorus (P)	.022	Sulphur (S)	.025
Silicon (Si)	.330	Chromium (Cr)	15.310
Nickel (Ni)	4.240	Cobalt (Co)	.060
Copper (Cu)	3.240	Moly (Mo)	.320
Nitrogen (N)	.036	Columbium (Cb)	.250
Titanium (Ti)	.010	Aluminum (Al)	.010
Tin (Sn)	.012	Boron (B)	.003
Tantalum (Ta)	.010	Vanadium (V)	.070
Tungsten (W)	.050		
Columbium/ Tantalum (Cb+Ta)	.260		
Iron (Fe)	Balance		
Frequency	.000	Severity	.000
Melt Practice	EA		
Refining Practice	AOD		
De-long Ferrite			

Knowingly & willfully falsifying or concealing a material act on this form, or making false, fictitious or fraudulent statements or representations herein could constitute a felony punishable under federal statutes. We hereby certify that the test results shown in this report are correct and accurate as contained in the records of the company and are in compliance with the specifications, codes, and standards listed above.

M.F. Marcano, Quality Manager

Castle Metals  
HEAT NUMBER G23367  
MECHANICAL ID \_\_\_\_\_  
ITEM CODE 46602  
LOT NUMBER \_\_\_\_\_  
PO NUMBER 381889  
RECEIPT DATE 10-3-16  
SUPPLIER Outokumpu  
SPECIFICATION \_\_\_\_\_  
LCS \_\_\_\_\_  
COMMENT \_\_\_\_\_  
APPROVED MB

*M.F. Marcano*



# Certificate of Test

Page: 1

HEAT G23367 ORDER 666310/ 01 BOL 0237083 \* CERTIFICATION \* 09/30/16

SHIP TO:  
A.M. CASTLE & CO.  
3800 ENTERPRISE DRIVE

JANESVILLE 535460000

361889 YOUR ORDER & DATE  
4/15/16 CUST# 0254001 CUST TAG#46602

GRADE 17-4 ITEM DESCRIPTION Ship Condition H1150  
Size 1/4 RND CFA H1150 2.5000 x 144.000 RL  
Country of Melt: UNITED STATES Country of Mfg.: UNITED STATES  
NAFTA Country of Origin is Country of Melt

No weld repair  
Free of mercury contamination, Free of radiation contamination  
No WEEE relevant substances; Meets EU electrical ROHS

Total Bundles 3 Total Weight 5138 Approx. Hot Red. Ratio 53:1

WC 2070944 Bundles: 1A, 1B, 1C

## SPECIFICATIONS

THE PRODUCTS LISTED ON THIS MILL TEST REPORT SATISFY PREFERENCE CRITERION B  
AS DEFINED IN ARTICLE 401 OF THE NORTH AMERICAN FREE TRADE AGREEMENT.

AMS 2303F UNS S17400, AISI 630  
ASME SA564 2015 Ed. ASTM A484 16  
ASTM A564 13 Type 630 DFARS 252.225.7009 10/4/11  
AM Castle 3174 04 R38 Sol Ann 1900F/1Hr/Rapid Cool  
Aged at 1150F for 4 hr, AC AMS 5643U Chemistry  
EN 10204 Type 3.1 Document  
1900F/ 1hour/ Air Cool  
1150F/ 4hours/ Air Cool

## MECHANICAL & OTHER TESTS

Hardness as shipped	336 HB			
Hardness as shipped	036 HRC			
Grain size	9.0	Tensile strength, KSI (MPa)	146.0 (1007)	
Micro	OK	0.2% Yield Strngth, KSI (MPa)	134.0 (924)	
Intergranular corrosion				
Macro	OK	Elongation % in 4D	21.0	
		Reduction of area %	67.0	
		Charpy (ft lb)	111 97 98 Avg 102	
		Charpy Test Temperature	RT	
Ferrite	1.0	Lateral Exp (mils)	61 54 49 Avg 54	

-- Continued --

*M.F. Mancini*